

As regards the last-named species, I wish to remark that Temminck was the first to separate *P. smaragdonotus* from its allies, and that it ought to remain under his name (amended). The "*Talève*" or "*Poule Sultane*" of Buffon, upon which the terms *madagascariensis* and *chloronotus* were subsequently founded, is a composite species composed of *P. cæruleus* and *P. smaragdonotus*, and these names should therefore not be adopted.

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The following papers were read :—

1. On an Earthworm of the Genus *Siphonogaster* from West Africa. By FRANK E. BEDDARD, M.A., Prosector to the Society.

[Received January 6, 1891.]

The Authorities of the Royal Gardens, Kew, have kindly forwarded to me some weeks since a box of Earthworms and castings from West Africa.

The worms were preserved in spirit and had been sent to Kew by His Excellency Sir A. Moloney, K.C.M.G., Governor of Lagos; they were collected in the Yoruba country, which lies to the north of Lagos.

A recent number of the 'Kew Bulletin'<sup>1</sup> contains a very noteworthy paper by Mr. Alvan Millson, Assistant Colonial Secretary of Lagos, upon the habits of these Earthworms, which he had himself collected and observed.

Unfortunately the state of preservation of the worms was not good, but I have nevertheless been able to ascertain the genus to which they belong, and to decide that they probably form a new species of that genus.

They are evidently referable to a very remarkable African genus, *Siphonogaster*, which has been quite lately described by Levensen<sup>2</sup>. His description, although necessarily (through the imperfect preservation of the specimen) incomplete, enables me to describe my species as new. I name it *Siphonogaster millsoni*, after Mr. Alvan Millson.

The most striking character of *S. ægyptiacus*, which is illustrated in the plate accompanying Herr Levensen's paper (*op. cit.* pl. vii. figs. 1, 2), is afforded by two appendages which are attached to the ventral side of the body upon the xvith or xviiith segment. These appendages are of considerable size, nearly one quarter of the length of the entire worm.

*Siphonogaster millsoni* has the same appendages, which are very much smaller, though the worm itself appears to be longer.

The largest specimen which I examined measured about 14 inches

<sup>1</sup> 'Bulletin of Miscellaneous Information,' no. 46, Oct. 1890, pp. 238-244.

<sup>2</sup> "Om to nye Regnormslægter fra Aegypten," Vidensk. Meddel. fra den Naturh. Foren. i Kjöbenhavn, 1889, p. 319.

in length, with a diameter at the widest part of about  $\frac{1}{8}$  inch. As the specimens were much softened, this length probably represents the extreme length of the worm in its most extended condition. The colour was almost black at the anterior end; further back a brown tint predominated; the posterior end of the body showed in many specimens a peculiar dark green colour, something like that of *Microchaeta rappii*<sup>1</sup>. The appendages in question are as shown in the accompanying drawings (woodcuts, figs. 1, 2), small, not longer

Fig. 1.

*Siphonogaster millsoni*.

Ventral view of anterior segments, showing the processes of segment xviii.

than two segments; they are directed backwards and appear sometimes as if they were adherent along their whole length to the ventral parietes. In other specimens they hang freely down.

Levinsen is in some little doubt about the number of the segment to which the appendages are attached. In *S. millsoni* they arise without doubt from the eighteenth segment, close to each other and on either side of the ventral middle line.

Their origin is from the middle of the antero-posterior diameter of the segment, just where the ventral pair of setæ would be placed were they developed upon this segment. They correspond, in fact, exactly to the first seta, as may be seen by an inspection of the ventral surface of the worm mounted in glycerine on a slide.

The setæ of this species, it should be remarked, are in couples, the distance between the individual setæ of each couple being considerable—greater in the case of the ventral couple.

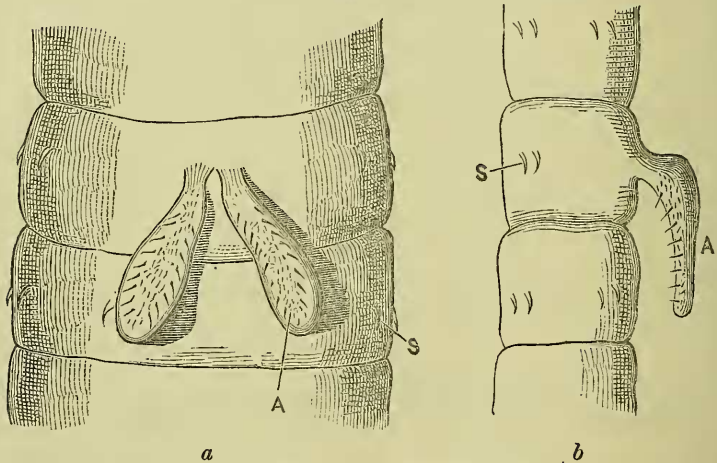
<sup>1</sup> Beddard, "On the Anatomy and Systematic Position of a Gigantic Earthworm, &c.," Trans. Zool. Soc. vol. xii. p. 63, pl. xiv.

On the eighteenth segment, as already mentioned, the ventral couples are absent, but the dorsal couples are present.

The shape of the setæ is very characteristic and is correctly given by Levisen (*loc. cit.* pl. vii. fig. 6). I could observe no differences, except with regard to size, on any part of the body. Their colour is, however, somewhat remarkable. The setæ of Earthworms are generally of a "horn-yellow" colour. In this species the colour appears to be much the same; but when a seta is viewed with the light passing from below through its entire length it appears distinctly red.

The appendages of the eighteenth segment are of an oval form (fig. 2, *a, b*), with a narrow neck connecting them with the body-

Fig. 2.



Appendages of *Siphonogaster millsoni*.

*a*, ventral view; *b*, lateral view of segments xvii-xx, showing the processes of the body-wall A; S, setæ.

wall; there was no trace of any infolding of the margins such as Levisen figures.

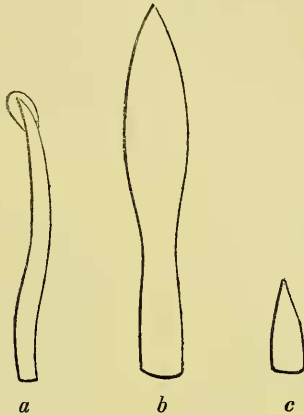
Each appendage is furnished, as in *S. ægyptiacus*, with a number of peculiar setæ, the shape and arrangement of which is rather different from that which characterizes *S. ægyptiacus*.

In that species there are three or four irregular series of the setæ, beginning at about the end of the first third of the appendage and reaching to its very extremity. In *S. millsoni* the setæ are disposed in two parallel lines, each of which is near the lateral margin of the appendage; they lie upon the posterior surface of the appendage.

The setæ themselves are shaped, as in *S. ægyptiacus*, like a spear-head with a very short shaft; but in *S. millsoni*, as shown in the accompanying drawing (fig. 3, p. 51), which may be compared

with Levinsen's figure (*loc. cit.* pl. vii. figs. 3, 5), the "spear-head" is longer than the shaft. Viewed laterally (fig. 3, *a*) each seta is seen to be curved from above downwards. Each of these setæ is invariably accompanied by an immature seta, the form of which can be understood by reference to the accompanying sketch (fig. 3, *c*) without any detailed description.

Fig. 3.

Genital setæ of *Siphonogaster millsoni*.

*a*, seta viewed in profile; *b*, ventral view of seta; *c*, immature seta.

Levinsen naturally regards these structures as copulatory organs, but considers that they may also have a respiratory function; this latter would seem possible on account of their large size and the rich plexus of blood-vessels with which they are furnished.

The small size of the appendages in *S. millsoni* is against their performing a respiratory function in that species, but I quite agree with Levinsen in believing that they are in all probability penes. Their position on the body and the spicules with which they are furnished favour this view.

The genital setæ of this *Siphonogaster* bear a very close resemblance to the genital setæ of *Nais elinguis*, which have recently been figured for the first time by Dr. A. Stolc<sup>1</sup>; the spear-head form and the proportions between the head and "shaft" appear to be nearly identical in the two forms; the curvature, too, exists in both, though it is considerably more pronounced in *Nais elinguis* than in the worm which forms the subject of the present communication.

This case of an Earthworm possessing setæ like those of the lower aquatic forms is very rare; indeed only one other example is known to me—that is, *Urochaeta*, in which Perrier first described the

<sup>1</sup> "Prispvěsky ku studiu Naidomorph," SB. böhm. Gesellsch. 1887, p. 227.

general setæ of the body as terminating in a bifid extremity like those of the Tubificidæ and some other families of aquatic Oligochæta. On the other hand, the characteristic *f*-shaped setæ of the terrestrial Oligochæta are often found among aquatic genera; it is the converse that is rare.

2. Notes on *Anodon* and *Unio*. By OSWALD H. LATTER, M.A., formerly Berkeley Fellow of Owens College, Manchester, 1888, late Tutor of Keble College, Assistant Master at Charterhouse. (Communicated by FRANK E. BEDDARD, M.A., Prosector to the Society.)

[Received November 13, 1890.]

(Plate VII.)

The following observations have been made from time to time during the last two years while working at *Anodon* and *Unio* for other purposes. I have thought it worth while to bring them together and publish them apart from the anatomical and other details which I hope to complete shortly. My investigations were begun in Manchester in 1888, while I held the Bishop Berkeley Fellowship, and I may take this opportunity of thanking the donor of that emolument for the facilities thereby afforded me and also Prof. Milnes Marshall for his kind advice and assistance in many ways.

I. *The Passage of the Ova from the Ovary to the External Gill-plate.*

In 1830 von Baer gave in Meckel's 'Archiv,' 1830, pp. 313-352, an account of this process, which has, so far as I can ascertain, been tacitly accepted by all later writers on the subject. My own observations have led me to somewhat different conclusions. Von Baer's account is briefly as follows:—The ova pass along the inner branchial passage, being prevented from falling into the internal gill-space by the labour contractions of the foot; thence they pass into the cloaca, into which the outer branchial passage also opens. All the muscles of the body are in a state of contraction during the passage of the ova, and furthermore the cloaca is small. In consequence of the muscular contraction the shell is closed and the ova accumulate in the cloaca, a few perhaps being emitted into the water before the closure is complete. The only direction therefore along which the pressure of ova can be relieved is forwards along the outer branchial passage and thus to the external gill-space. It is to be noticed that von Baer does not state that he has *observed* these phenomena, but merely draws his conclusions from the anatomical relations of the various organs.

I have myself observed the passage of ova as far as the cloaca. The genital aperture, as is well known, is situated ventral of and